

Claims

We claim:

1. A method for improving routing operations in dynamic routing tables comprising:
  - (a) establishing  $s$  to be used in a prefix partitioning scheme;
  - (b) partitioning at least one prefix into up to  $\min(n, 2^s + 1)$  partitions;
  - (c) assessing prefix length with regard to  $s$ ;
  - (d) storing the prefix whose length is larger than or equal to  $s$  in a partition that corresponds to the value of the prefix's first  $s$  bit;
  - (e) storing prefixes whose length is smaller than  $s$  in a first designated partition; and
  - (f) representing the prefixes in each partition using a router table data structure.
2. The method according to claim 1, wherein the representative router table structure is a dynamic router-table data structure.
3. The method according to claim 2, wherein the dynamic router-table data structure is selected from a group consisting of BOB; PBOB; LMPBOB; B-tree data structure; CRBT; ACRBT; PST; HOT; BOT, and one bit TRIE.
4. The method according to claim 1, wherein the representative router table structure is a static router-table data structure.
5. The method according to claim 4, wherein the static router-table data structure is selected from a group consisting of a linear array; trie-based data structures; and hash trees organized by prefix length.
6. The method according to claim 1, further comprising the steps of:
  - (a) establishing  $t$  to be used for further partitioning the prefixes whose length is smaller than  $s$ ;

- (b) assessing the length of the prefixes stored in the designated partition with regard to  $t$ ;
- (b) partitioning at least one of the prefixes whose length is larger than or equal to  $t$  in up to  $\min(n, 2^t + 1)$  partitions, wherein the prefix whose length is smaller than  $s$  and larger than or equal to  $t$  is placed in a partition based on the value of the prefix's first  $t$  bit; and
- (c) storing the prefixes whose length is smaller than  $s$  and  $t$  into a second designated partition.

7. The method according to claim 1, further comprising the step of indexing nonempty partitions using an array or a hash table.

8. A computer program product recorded on computer readable medium for routing packets comprising; a computer readable medium for receiving packets specifying prefixes and decision rules for the prefixes; a computer readable medium for establishing  $s$  bits to be used in a prefix partitioning scheme; a computer readable medium for matching, inserting, or deleting prefixes in a partitioning tree; and a computer readable medium for performing steps of multilevel partitioning, said steps comprising:

- (a) establishing  $s$  to be used in a prefix partitioning scheme;
- (b) partitioning at least one prefix into up to  $\min(n, 2^s + 1)$  partitions;
- (c) assessing prefix length with regard to  $s$ ;
- (d) storing the prefix whose length is larger than or equal to  $s$  in a partition that corresponds to the value of the prefix's first  $s$  bit;
- (e) storing prefixes whose length is smaller than  $s$  in a first designated partition; and
- (f) representing the prefixes in each partition using a router table data structure.

9. The computer program according to claim 8, wherein the dynamic router-table data structure is selected from a group consisting of BOB; PBOB; LMPBOB; B-tree data structure; CRBT; ACRBT; PST; HOT; and BOT.

10. The computer program according to claim 8, wherein the representative router table structure is a static router-table data structure.

11. The computer program according to claim 10, wherein the static router-table data structure is selected from a group consisting of a linear array; trie-based data structures; and hash trees organized by prefix length.

12. The computer program according to claim 8, wherein the computer readable medium for performing the steps of multilevel partitioning further comprises the steps of:

- (a) establishing  $t$  to be used for further partitioning the prefixes whose length is smaller than  $s$ ;
- (b) assessing the length of the prefixes stored in the designated partition with regard to  $t$ ;
- (c) partitioning at least one of the prefixes whose length is larger than or equal to  $t$  in up to  $\min(n, 2^t + 1)$  partitions, wherein the prefix whose length is smaller than  $s$  and greater than or equal to  $t$ , is placed in a partition based on the value of the prefix's first  $t$  bit; and
- (d) storing the prefixes whose length is smaller than  $s$  and  $t$  into additional bits into a second designated partition.

13. A computer system comprising: a memory containing a partitioning routing table constructing program having functions for constructing a routing table with partitions based on the first  $s$  bits of a prefix; wherein the prefixes in each partition are represented by a router table data structure; and a processor for executing the partitioning routing table constructing program.

14. The computer system according to claim 13, wherein the partitioning routing table constructing program further includes functions for constructing partitions based on the first  $t$  bits of a prefix.